APPLICATION FOR UNITED STATES PATENT

TITLE OF INVENTION

Rotary Float

INVENTOR

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CROSS-REFERENCES TO RELATED APPLICATIONS

(Not applicable)

STATEMENT AS TO RIGHTS TO INVENTIONS MADE UNDER FEDERALLY SPONSORED RESEARCH AND DEVELOPMENT

(Not applicable)

BACKGROUND OF THE INVENTION

(1) Field of the Invention

The present invention relates generally to an equine dental files or floats, and more particularly to an improved float with rotating and pivotable head.

(2) Background Information

The teeth of a horse are continuously erupting as they wear, and it is typically necessary to periodically file projecting edges of the teeth, to maintain good equine health. Without such "floating," the horses' teeth will develop sharp edges, points and hooks that can lacerate the horse's cheeks and tongue.

The instrument utilized to file the teeth of a horse is commonly referred to as a "float". The conventional float has a head with carbide grit, similar to sandpaper. The size of the grit will determine the coarseness of the float head, and the speed with which the tooth will be ground down to proper shape.

One common problem with prior art equine floats was the length of time that the float head would retain sufficient grit for effective floating. As with sandpaper, the grit eventually wears off of the float head until the file must be replaced or rebuilt. This

problem was addressed by the inventor herein in U.S. Patent No. 5,533,894, wherein a float was provided with a series of cutting teeth on separate faces of a cutting head. When one face became worn, the head was turned to a new face, and floating could continue.

While the float with multiple cutting edges was a successful improvement, it is still a problem to reach various portions of a horse's mouth, for effecting floating. The rigid handle of typical floats hinders the ability of the technician to effectively and conveniently reach all of the teeth in a horse's mouth.

BRIEF SUMMARY OF THE INVENTION

It is therefore a general object of the present invention to provide an improved equine dental float.

A further object of the present invention is to provide an equine dental float with a rotary head.

Yet another object is to provide a rotary float with a pivotable handle.

These and other objects will be apparent to those skilled in the art.

The rotary float of the present invention includes an elongated tubular arm with a drive shaft rotatably mounted therethrough. A drive unit is coupled to a rearward end of the shaft to rotate the shaft. A swivel on the forward end of the drive shaft connects the drive shaft to a collet shaft within an extension tube, and transmits rotational force from the drive shaft to the collet shaft. The extension tube is connected to the arm at a knuckle joint, which permits the extension tube to pivot about the forward end of the

arm. A bit is mounted on the forward end of the collet shaft, for grinding a surface adjacent the forward end of the extension tube.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which similar or corresponding parts are identified with the same reference numeral throughout the several views, and in which:

Figure 1 is a perspective view of a rotary float of the present invention;

Figure 2 is a perspective view of the float with portions partially disassembled and exploded for clarity;

Figure 3 is an enlarged side elevational view of the forward end of the float of Figure 1; and

Figure 4 is a super-enlarged perspective view of the pivoting knuckle of the float.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, in which similar or corresponding parts are identified with the same reference numeral, and more particularly to Figure 1, the rotary float of the present invention is designated generally at 10, and includes an elongated arm 12 extending forwardly through a support housing 14. A pistol-grip type handle 16 is attached to housing 14, to provide a convenient location for holding float 10. A rotatable shaft 18 (shown in Figures 2 and 4) extends through arm 12, and has a connector 20 on the rearward end thereof. Connector 20 permits connection of drive

shaft 18 to a rotary tool, which will cause the selective rotation of drive shaft 18 in arm 12.

The forward end 12a of arm 12 has a knuckle 22, which permits the pivotal movement of an extension 24, connected to the forward end of arm 12. Extension 24 has a removable cap 26 with an opening 28 formed in one side proximal the forward end 26a, to thereby expose a grinding bit 30 mounted on the forward end of shaft 18.

Referring now to Figure 2, extension 24 and knuckle 22 are shown partially disassembled, to reveal the structure in more detail. Arm 12 is a hollow tube with shaft 18 extending therethrough and supported on conventional sealed bearings. A separate drive unit will rotate shaft 18, which will then rotate bit 30 in extension 24. The forward end 12a of arm 12 is exteriorly threaded, and will receive the rearward end of knuckle base 32. Knuckle base 32 includes a rearwardly extending collar 34 having an outer diameter the same as arm 12, and interiorly threaded to engage the threads on arm forward end 12a. Thus, collar 34 will extend forwardly flush with arm 12 when attached to the forward end of arm 12.

A hollow spherical ball 36 is mounted on the forward end of collar 34 and has a truncated forward end 36a from which shaft 18 projects. Collar 34 and/or ball 36 preferably have a bearing race (not shown) mounted therein, to receive shaft 18 and permit the rotation of the shaft with little friction.

Extension 24 includes a short tube 38 with bearing races (not shown) in the forward and rearward ends to rotatably support a short collet shaft 18a therethrough.

The rearward end 38b of extension tube 38 has an enlarged bell 40 formed thereon, with threads 42 formed on the exterior surface. The interior surface 44 of bell 40 is spherical in shape, as shown in Figure 4, with a diameter to snugly but slidably receive ball 36 of knuckle base 32, such that extension tube 38 will smoothly pivot about ball 36 (see Figure 2 and 3).

A collet 46 is mounted on the forward end of collet shaft 18a (shown in Figure4) and will selectively retain the shank of bit 30 therein in a conventional manner, thereby permitting simple replacement of bit 30, as needed. It should be noted that any method for removably mounting bit 30 on collet shaft 18a is within the scope of the invention, and the inventor does not intend to rely solely on the use of a collet to accomplish this goal.

The rearward end of collet shaft 18a (shown in Figure 4) is mounted to a swivel device 48, which is mounted to the forward end of shaft 18, as shown in Figure 2. Swivel device 48 may be of various forms, such as a universal joint, or a helical coupler 50 as specifically shown in Figures 2 and 4. Swivel device 48 transmits the rotational movement of shaft 18 to collet shaft 18a, while permitting pivotal movement of collet shaft 18a at swivel device 48.

Referring now to Figure 4, swivel device 48 is shown in more detail. In the preferred embodiment of the invention swivel device 48 is a helical coupler 50 having a head end 52 and a foot end 54 connected together by a helical coil 56. Head end 52 and foot end 54 are connected to their respective shafts 18a and 18, respectively, with

a roll pin 58, to permit disassembly as required. As shown in Figure 2, helical coupler 50 is enclosed within ball 36, to permit pivotal rotational movement of the coupler.

Referring once again to Figure 2, a securement collar 60 is provided with interior threads 62 to engage the exterior threads 42 of bell 40. The rearward end 60b of collar 60 is provided with an annular lip 64 directed radially inwardly to an inner diameter less than the outer diameter of ball 36, to thereby retain ball 36 within bell 40 when collar 60 is secured to bell 40, as shown in Figures 1 and 3.

Referring now to Figure 1, handle 16 is attached to housing 14 to permit a user to more easily grip and control float 10. In the preferred embodiment an electrical cord 66 extends from handle 16 and is electrically connected at one end to variable speed trigger 68, and at the other end to a drive unit (not shown) for driving shaft 18. Trigger 68 permits the user to selectively operate the drive unit and thus the rotation of shaft 18. However, operation of the drive unit may also be accomplished in any other conventional fashion. For example, many rotary tools provide foot-operated pedals to operate the drive unit. In addition, the drive unit can be simply turned on and off, to provide constant power to the shaft 18.

Referring again to Figure 2, cap 26 has an inner diameter slightly greater than the outer diameter of bit 30 and extension tube 38, to permit the cap rearward end 26b to slide over bit 30 and extension tube 38 and receive them within cap 26. A resilient, compressible O-ring 72 is mounted around the exterior perimeter of extension tube 38, proximal to bell 40, and has an outer diameter slightly greater than the inner diameter

of cap 26. In this way cap 26 is selectively secured in position over the bit 30 and extension tube 38 by the frictional engagement of O-ring 72 with the interior surface of the rearward end 26b of cap 26. This friction fit also permits the cap to be rotated so that opening 28 in the forward end 26a of cap 26 is directed in the desired position relative to the handle14 (see Figure 1).

In operation, a bit 30 is mounted in collet 46 for rotation with collet shaft 18a, as shown in Figures 2 and 4. Bit 30 may be of any desired type and various styles are used in the filed of rotational grinding tools. Cap 26 is then slid over bit 30 and extension tube 38 and frictionally engaged upon O-ring 72.

Once ready for operation, float 10 is connected to a conventional drive unit by connecting drive shaft 18 to the drive shaft of the drive unit at coupler 20. In the preferred embodiment of the invention, electrical cord 20 is connected to a junction box, which interconnects a power source with trigger 68 and the drive unit. Trigger 68 is then depressed to operate the drive unit and cause shaft 18, extension shaft 18a and bit 30 to rotate at the desired velocity. In other versions of the invention, handle 16 and/or trigger 68 may not be used. In those embodiments, the drive unit is operated in its usual manner to rotate drive shaft 18 and bit 30.

In order to reach selected teeth within a horse's mouth, extension 24 may be pivoted on ball 36, as shown in Figure 3. Preferably, pivotal movement within an arc of about 30° from the longitudinal axis of arm 12 and shaft 18 is sufficient to provide maneuverability and flexibility in the confined space of a horse's mouth. In addition,

cap 26 may be rotated about the longitudinal axis of collet shaft 18a, and frictionally held in position by O-ring 72, to direct opening 28 in the forward end 26a of cap in the desired orientation. Because of the use of swivel device 48 (see Figures 2 and 4), bit 30 will continue to rotate at the desired speed throughout the pivoting of extension 24.

Whereas the invention has been shown and described in connection with the preferred embodiment thereof, many modifications, substitutions and additions may be made which are within the intended broad scope of the appended claims.